UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/813,522	03/21/2001	Kenneth E. Madsen	1109.003CIP	3556

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EXAMINER
NAHAR, QAMRUN

ART UNIT	PAPER NUMBER
2124	8

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/813,522	MADSEN ET AL.
	Examiner	Art Unit
	Qamrun Nahar	2124

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _21 March 2001_.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-49_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-9,11-15 and 18-49_ is/are rejected.

7)☒ Claim(s) _10, 16 and 17_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _12 May 2003_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _4, 5, 7_.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____ .

DETAILED ACTION

1. Claims 1-49 have been examined.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3.   Claims 27-31 and 33-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4.   Claim 27 recites "(iv) allocating memory in the buffer of the size determined in (g)" on lines 12-13 of the claim. This is indefinite because there is no step (g), where the size is determined. Step (iii) in the claim does determine the size. Therefore, this limitation is interpreted as (iv) allocating memory in the buffer of the size determined in (iii).

     Claims 28-31 are rejected for dependency upon rejected base claim 27 above.

5.   Claim 33 recites "(iv) allocating memory in the buffer of the size determined in (g)" on lines 10-11 of the claim. This is indefinite because there is no step (g), where the size is determined. Step (iii) in the claim does determine the size. Therefore, this limitation is interpreted as (iv) allocating memory in the buffer of the size determined in (iii).

     Claims 34-39 are rejected for dependency upon rejected base claim 33 above.

Claim Rejections - 35 USC § 102

6.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7.   Claims 1-9, 11-15, 18-19, 22-44, 46, 48 and 49 are rejected under 35 U.S.C. 102(e) as

being anticipated by Smolders (U.S. 6,223,338).

Per Claim 1:

The Smolders patent discloses:

- a method for monitoring run time execution of software code in a target system ("A

method and system within a data processing system are disclosed for directly accessing code

from a running program (hereafter called a process) by taking a trace by way of using an

interruption." in column 1, lines 66-67 to column 2, lines 1-2)

- (a) searching a range of addresses within the software code to identify a desired

instruction ("According to the present invention, the processor is programmed to generate a

trace interrupt after each branch, or at the end of each basic block of code from the currently

running program or process." in column 2, lines 2-5)

**- (b) replacing the desired instruction with a program flow change instruction directing
execution to a buffer; and (c) inserting a routine into the buffer, the routine having an
output instruction and a branch instruction branching to an address of the software code
subsequent to the program flow change instruction** ("At each interrupt, the address of the
beginning of the next block is saved which is the address where the interruption came from.
Tracing information for the previous block including its address and its size (the current value of
a counter) is created. If the current process is a process to be traced, the tracing information is
stored in a trace buffer, the counter is reset to zero returning back to the process from the
interrupt." in column 2, lines 10-17).

Per Claim 2:

The Smolders patent discloses:

- wherein the output instruction generates output to a trace buffer (column 2, lines 10-17).

Per Claim 3:

The Smolders patent discloses:

- wherein the trace buffer is disposed on the target system (column 2, lines 48-52).

Per Claim 4:

The Smolders patent discloses:

- comprising (e) storing information in an instrumentation table to undo said replacing (b)

and said inserting (c) (column 3, lines 66-67 to column 4, lines 1-5).

Per Claim 5:

The Smolders patent discloses:

- **wherein the instrumentation table is disposed on a host system communicably coupled to
the target system** (column 3, lines 66-67 to column 4, lines 1-5).

Per Claim 6:

The Smolders patent discloses:

- **wherein said storing (e) comprises storing the desired instruction, address of the desired
instruction, action to be performed by the program flow change instruction, address of the
buffer, size of the routine, and an identifier associated with the action to be performed**
(column 3, lines 66-67 to column 4, lines 1-5).

Per Claim 7:

The Smolders patent discloses:

- wherein the target system includes a cache and at least a portion of the software code

executes externally of the cache (column 3, lines 4-13).

Per Claim 8:

The Smolders patent discloses:

- wherein the target system includes a bus and at least a portion of the software code

executes on the bus (column 3, lines 4-13).

Per Claim 9:

The Smolders patent discloses:

- wherein said searching (a) further comprises searching for a plurality of desired

instructions (column 2, lines 2-5).

Per Claim 11:

The Smolders patent discloses:

- wherein said searching (a) comprises searching for a desired instruction disposed at the

beginning of a program function (column 2, lines 2-5).

Per Claim 12:

The Smolders patent discloses:

- wherein the desired instruction comprises a Move From Special Register instruction

(column 3, lines 34-54).

Per Claim 13:

The Smolders patent discloses:

- wherein said searching (a) comprises searching for an other desired instruction disposed

at the ending of a program function (column 2, lines 2-5).

Per Claim 14:

The Smolders patent discloses:

- wherein the other desired instruction comprises a Move To Special Register instruction

(column 3, lines 34-54).

Per Claim 15:

The Smolders patent discloses:

- wherein said searching (a) comprises searching for at least one desired instruction

associated with data manipulation (column 4, lines 54-59).

Per Claim 18:

 The Smolders patent discloses:

- wherein said searching (a) comprises searching for a branch instruction, and searching for the desired instruction in a portion of the software code indicated by the branch instruction, the desired instruction being disposed outside of the range of addresses identified (column 4, lines 54-59).

Per Claim 19:

 The Smolders patent discloses:

- wherein the desired instruction comprises an EABI instruction (column 4, lines 54-59).

Per Claim 22:

 The Smolders patent discloses:

- wherein the program flow change instruction comprises an instruction to read from an odd address (column 3, lines 54-59).

Per Claim 23:

 The Smolders patent discloses:

- wherein the program flow change instruction comprises an instruction to add an odd integer to an address (column 4, lines 5-9).

Per Claim 24:

The Smolders patent discloses:

- wherein the routine has a decoding instruction to identify the odd integer and execute an instruction corresponding thereto (column 4, lines 9-19).

Per Claim 25:

The Smolders patent discloses:

- comprising a plurality of program flow change instructions corresponding to a plurality of user-selectable operations (column 3, lines 29-54).

Per Claim 26:

The Smolders patent discloses:

- wherein each of said plurality of user-selectable operations is selected from the group consisting of: indicating entry and exit of a function; indicating entry and exit of a function and tracing execution of a function; indicating entry and exit of a function, tracing

execution of the function, and indicating entry and exit and tracing execution of other

functions called by the function; indicating Entry and Exit of a function, tracing execution

of the function, and indicating Entry and Exit without tracing execution of other functions

called by the function; indicating data manipulation; inserting patch code into a code

portion; indicating the sequence of program execution; and indicating changes to variables

(column 4, lines 16-19).

Per Claim 27:

The Smolders patent discloses:

- wherein said inserting (c) comprises: (i) selecting at least one output code statement to

perform a selected one of said user-selectable operations; (ii) saving a copy of the output

code statement and the desired instruction; (iii) determining the size of the output code

statement, the branch instruction, the desired instruction, and restore code to restore the

desired instruction; and (iv) allocating memory in the buffer of the size determined in (iii);

and (v), inserting the output code statement, the branch instruction, the desired instruction,

and restore code, into the allocated memory (column 4, lines 9-19).

Per Claim 28:

The Smolders patent discloses:

- **wherein said saving (ii) comprises saving a copy of the program flow change instruction and the desired instruction in a translation table** (column 5, lines 39-44).

Per Claim 29:

The Smolders patent discloses:

- **wherein said selecting (i) comprises analyzing a symbol table of the software code** (column 4, lines 16-19).

Per Claim 30:

The Smolders patent discloses:

- **wherein said selecting (i) comprises calling a function selected from the group consisting of a printf or scanf function** (column 4, lines 16-19).

Per Claim 31:

The Smolders patent discloses:

- **wherein the restore code comprises code to save and restore original register contexts** (column 4, lines 9-16).

Per Claim 32:

The Smolders patent discloses:

- wherein said searching (a) comprises identifying addresses in the program code that are associated with each instance of a modification of an identified variable/structure, and locating a final instruction for each instance of a modification, the final instruction being said desired instruction (column 4, lines 5-9).

Per Claim 33:

The Smolders patent discloses:

- wherein said inserting (c) comprises: (i) selecting at least one output code statement to transfer data to the buffer; (ii) saving a copy of the output code statement and the desired instruction; (iii) determining the size of the output code statement, the desired instruction, and restore code to restore the desired instruction; (iv) allocating memory in the buffer of the size determined in (iii), and to run the trace acquisition code; (v) inserting the output code statement, the branch instruction, the desired instruction, and restore code, into the allocated memory (column 4, lines 9-19).

Per Claim 34:

The Smolders patent discloses:

- **wherein said allocating (iv) further comprises allocating additional memory of the size determined in (iii) for each said instance of a modification of an identified variable/structure** (column 4, lines 9-19).

<u>Per Claim 35:</u>

The Smolders patent discloses:

- **further comprising repeating said inserting (v) for each said instance** (column 4, lines 9-19).

<u>Per Claim 36:</u>

The Smolders patent discloses:

- **wherein said saving (ii) comprises saving a copy of the program flow change instruction and the desired instruction in a translation table** (column 5, lines 39-44).

<u>Per Claim 37:</u>

The Smolders patent discloses:

- **wherein said selecting (i) comprises analyzing a symbol table of the software code** (column 4, lines 16-19).

Per Claim 38:

The Smolders patent discloses:

- wherein said selecting (i) comprises calling a function selected from the group consisting of a printf or scanf function (column 4, lines 16-19).

Per Claim 39:

The Smolders patent discloses:

- wherein the restore code comprises code to save and restore original register contexts (column 4, lines 9-16).

Per Claim 40:

The Smolders patent discloses:

- further comprising reversing said replacing (b), and inserting (c), to restore the software code (column 4, lines 9-19).

Per Claim 41:

The Smolders patent discloses:

- wherein at least one of said searching (a), replacing (b), and inserting (c), is performed during run time execution of the software code (column 1, lines 66-67 to column 2, lines 1-2).

Per Claim 42:

The Smolders patent discloses:

- wherein at least one of said searching (a), replacing (b), and inserting (c), is performed after the software code is compiled (column 1, lines 66-67 to column 2, lines 1-2).

Per Claim 43:

The Smolders patent discloses:

- wherein execution of the software code is halted during performance of said at least one of said searching (a), replacing (b), and inserting (c) (column 1, lines 66-67 to column 2, lines 1-2).

Per Claim 44:

The Smolders patent discloses:

- comprising executing the software code (column 1, lines 66-67 to column 2, lines 1-2).

Per Claim 46:

This is a system version of the claimed method discussed above, claim 1, wherein all

claim limitations also have been addressed and/or covered in cited areas as set forth above.

Thus, accordingly, this claim is also anticipated by Smolders.

Per Claim 48:

This is an article of manufacture version of the claimed method discussed above, claim 1,

wherein all claim limitations also have been addressed and/or covered in cited areas as set forth

above. Thus, accordingly, this claim is also anticipated by Smolders.

Per Claim 49:

This is a computer readable program code version of the claimed method discussed

above, claim 1, wherein all claim limitations also have been addressed and/or covered in cited

areas as set forth above. Thus, accordingly, this claim is also anticipated by Smolders.

Claim Rejections - 35 USC § 103

8.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

9.   Claims 20-21, 45 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Smolders (U.S. 6,223,338) in view of Davidson (U.S. 5,664,191).

Per Claim 20:

The rejection of claim 1 is incorporated, and further, Smolders does not explicitly teach wherein the searching (a) comprises using debug information to identify the desired instruction. Davidson teaches wherein the searching (a) comprises using debug information to identify the desired instruction (column 2, lines 46-50).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the method disclosed by Smolders to include wherein the searching (a) comprises using debug information to identify the desired instruction using the teaching of Davidson. The modification would be obvious because one of ordinary skill in the art would be motivated to identify basic blocks more efficiently.

Per Claim 21:

The rejection of claim 20 is incorporated, and Davidson further teaches wherein the searching (a) comprises using complier-derived debug information in a format selected from the group consisting of stabs, elf, and dwarf formats (column 5, lines 22-27).

Per Claim 45:

This is another version of the claimed method discussed above (claims 1 and 20), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

Per Claim 47:

This is a system version of the claimed method discussed above (claims 1 and 20),

wherein all claim limitations also have been addressed and/or covered in cited areas as set forth

above. Thus, accordingly, this claim is also obvious.

Allowable Subject Matter

10.   Claims 10, 16 and 17 are objected to as being dependent upon a rejected base claim, but

would be allowable if rewritten in independent form including all of the limitations of the base

claim and any intervening claims.

11.   The following is a statement of reasons for the indication of allowable subject matter:

The cited prior art taken alone or in combination fail to teach, in combination with the

other claimed limitations, a method that selectively disables a cache for the purpose of

facilitating debugging activities, that is, wherein the routine comprises a cache disabling

instruction and a cache re-enabling instruction as substantially recited in claims 10, 16 and 17

and as pointed out in the Notice of Allowance of continuation in part application, 09/310441,

now U.S. 6,397,382.

Conclusion

12.   The prior art made of record and not relied upon is considered pertinent to applicant's
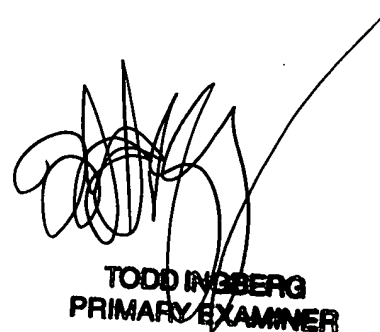
disclosure.

13.   Any inquiry concerning this communication from the examiner should be directed to

Qamrun Nahar whose telephone number is (703) 305-7699. The examiner can normally be

reached on Mondays through Thursdays from 9:00 AM to 6:30 PM. The examiner can also be

reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Kakali Chaki, can be reached on (703) 305-9662. The fax phone number for the

organization where this application or processing is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is (703) 305-3900.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

QN
April 27, 2004

TODD INGBERG
PRIMARY EXAMINER